Numerical Methods

1. **Course number and name:** 020MENES1 – Numerical Methods

2. **Credits and contact hours:** 2 credits, 2x1:15 contact hours

3. **Instructor's or course coordinator's name:** Georges Sakr

4. **Textbook:**
   Analyse Numérique, Dany Mezher and Romain Bossart, October 2016.

5. **Specific course information**
   a. **Catalog description:**
      Introduction to numerical calculation, error analysis and propagation, numerical software, interpolation and approximation, integration and differentiation, numerical solution to differential equations, finite difference method, matrices, resolution of linear systems, matrix decomposition, eigenvalues and eigenvectors, non-linear system of equations.

   b. **Prerequisites or co-requisites:** 020CDINI3 Differential Calculus and Integrals or 020AN2CI3 Analysis 2, 020ALLNI2 Linear Algebra or 020AL1CI2 Algebra 1.

   c. **Required:** Required for EE program

6. **Specific goals for the course**
   a. **Specific outcomes of instruction:**
      The student will be able to identify, formulate and solve an engineering problem using numerical methods to solve differential equations.

   b. **KPI:**

KPI	A1	A2	E1	E2	E3	G1	G2	I2	K1	K2	K3
Covered			x	x	x				x	x	x
Assessed	x	x	x	x	x	x	x	x	x	x	x

7. **Brief list of topics to be covered**

Topics
Error analysis and propagation
Numerical software
Interpolation and approximation, Lagrange, Newton, Spline
Differentiation and integration
Numerical solutions to differential equations
Finite difference method

Matrices
Reolution of linear system of equations
Resolution of non-linear system of equations
Eigenvalues and eigenvectors